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DOXIADIS ASSOCIATES
Consulting Engineers
10 Venizelou Street
ATHENS GREECE
Tel: 28857 - 31604
Cables: DOXASSOC

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CLASSIFICATION SYSTEM USED BY DOXIADIS ASSOCIATES

A The Problems

B The Policies

C The Programs

D People, Development, and Ekistics**
- Geographic factors
- Social factors
- Industry
- Agriculture
- Transportation

E Houses

F Structures
(exclusive of Houses)

G Community services
Utilities and Social Services

H Regions

I Major urban centers

J Market towns
- Medium-sized and small towns
- New towns

K Villages
- Rural land

L Farms

M Surveys
- Census data
- Topographical surveys

N Research
(and Technical Education)

O Planning
(and Landscaping)

P Financing

Q Urban Land

R Labor

S Materials

T Construction
Systems of Building and Costs

U Implementation

V Management

W Administration

X Legislation

**Refers to centers of activities in relation to their surrounding regions.

A Netschert, B. C. and S. H. Schurr. 261
Atomic energy applications with reference to underdeveloped countries.
Rodwin, Lloyd 256
Linking economic development and urbanization policy in developing areas.

United Nations. Bureau of Social Affairs. 283
First report on the current activities of the United Nations, its Regional Economic Commission and the specialized agencies in the fields of housing, building and planning.

B Mumford, Lewis A new approach to workers' housing. 274
Rodwin, Lloyd 256
Linking economic development and urbanization policy in developing areas.
Sutherland, Alasdair C. 280
Report on school on village planning

D Design as a political force 260
Mumford, Lewis. A new approach to workers' housing. 274
Netschert, B. C., and S. H. Schurr. 261
Atomic energy applications with reference to underdeveloped countries.

D Thermal sea water power plant 262

E Alweyl, A. 294
A Comparative study of housing costs for different building types and densities
Kayanan, A. C. 263
Casas-en-hilera
Kayanan, A. C. Construccion de casas de "bahareque modular" 264
Leonidas Trujillo Molina, Rafael. 272
The problem of the dwelling-houses.
Masalah bangunan, the official journal of the Regional 273
Housing Centre, Bandung.
Mumford, Lewis. A new approach to workers' housing. 274

F Voorhees Walker, Foley & Smith 296
Climate control for housing in the tropics and sub-tropics.

G Sutherland, Alasdair C. Report on school on village planning 280

H Rodwin, Lloyd. 256
Linking economic development and urganization policy in developing areas
Simey, T. S. A new capital for the British West Indies 277

K Alcock, A. E. S., and H. M. Richards. 278
How to plan your village
Sutherland, Alasdair C Report on school on village planning 280

N Great Britain. Building Research Station Colonial building notes. 282
Masalah bangunan, the official journal of the Regional Housing 273
Centre, Bandung.
United Nations. Bureau of Social Affairs. 283
First report on the current activities of the United Nations, its Regional Economic Commission and the specialized agencies in the fields of housing., building and planning.
Sutherland, Alasdair C. Report on school on village planning 280

O Alcock, A. E. S., and H. M. Richards 278
How to plan your village
Simey, T. S. 277
A new capital for the British West Indies

S United Nations. Economic Commission for Asia and the Far East. Survey of housing and building materials in Asia and the Far East, 1956. 285

T Alweyl, A.
A comparative study of housing costs for different building types and densities 294
Kayanan, A. C. Casas-en-hilera. 263
Kayanan, A. C. Construccion de casas de "bahareque modular" 264
United Nations. Economic Commission for Asia and the Far East. Survey of housing and building materials in Asia and the Far East, 1956. 285
Voorhees, Walker, Foley & Smith
Climate control for housing in the tropics and sub-tropics 296

HIB - GA : 22
p. 256

B
711.1

Rodwin, Lloyd. Linking economic development and urbanization policy in developing areas. A report to the Housing, Building and Planning Branch, Bureau of Social Affairs, United Nations. (Cambridge, Mass.), The author, (1956). var. pg. To appear in a forthcoming volume by the Regional Science Association.

1. Professor Rodwin's paper is divided into three sections: 1, National urban planning and regional capital budgets for developing areas; 2, Appendix A: The British new towns policy as a physical planning tool for the distribution of population; 3, Appendix B: Selected bibliography.

2. After acknowledging the role of the United States in transforming the economy of developing areas, the author remarks that few, if any, countries have devised mechanisms for overall planning of urban patterns, or means of linking effectively national economic planning and urban development. Economic planning and urban planning operations have been compartmentalized; they are conducted by technicians with different goals, different concepts, different tools. Resources in developing areas are limited, particularly personnel, data, and administrative experience.

3. Literature is begining to express concern about dual economics, parasitic cities, about the need for balanced economic development. Beyond a certain size there may be some net diseconomics of scale; there are some arguments for small scale enterprise adapted to local labor and goods markets. Self help programs may be more feasible in smaller cities. What these portend may be controversial, but one thing is certain; it is the course that many of the world's underdeveloped economics have chosen to undertake.

4. Supposing that a country wanted an overall urban pattern, had the administrative machinery to pursue such a policy, and adequate capital allocating devices, additions to the planning machinery are necessary to carry out such a policy. Resource and economic base studies, shifts in location and scale of overhead capital investments, special tax, labor training and incentive programs, adaptation of customary land use measures, (such as subdivision regulations, zoning and industrial location controls) are examples of some of the tools which would have to be deployed for those purposes. There would also be need for a national urban development plan, and for a regional capital budgeting procedure. The former would provide a sense of direction, the latter a strategic control and steering mechanism. Statistics have been offered to show that a large proportion of resources available for capital investment in developing areas -- 50 per cent to 70 per cent -- falls into the category of overhead capital: ports, power, transportation, water, utilities, housing, schools, hospitals, etc. Often it is this capital which can create the necessary conditions for the market mechanism to function: it triggers private development, makes it actually profitable for the private firms, and ultimately for the community. It would therefore be important to have some urban development plan so that this strategic overhead capital might serve the desired ends.

5. To spell out such a plan was beyond the scope of this paper, but a few general comments are offered. If a unit in the Planning Ministry were assigned responsibility for the national urban development plan, the interdependence of the national economic plan would make close collaboration in the preparation of both plans essential. Similar coordination would be necessary horizontally and vertically. The economic plan itself would probably follow the conventional technique on the national scale of influencing the direction of investment for economic development with regard to the country's goals, resources, and economic potentials. The national urban development plan might start with an evalution of the goals of the plan, with projections of the probable scale, character and patterns of urban development. Development would take into account transportation networks, resource base, economic potentials, development requirements, investment alternatives and estimated physical and economic effects.

6. Existing knowledge on these matters is poor. One of the less explored aspects of economic development are the criteria -- political, economic, social, and military -- by which overhead capital has been or should be allocated to different regions for development. Meanwhile some information may be gleaned from the literature published on the functions of cities and their role in economic development. Implementation should prove instructive in bringing to light some unanticipated problems.

7. In illustrating how such a plan might influence development, Puerto Rico is considered. Decentralization is being regarded sympathetically by top policy makers, some emphsis is placed on housing and urban renewal in small towns. Substantial rates of growth are occurring in urban centers. Theoretically, the island could be treated:

(a) As one large metropolitan center with San Juan as the great regional conurbation, the mountainous region in the center as the greenbelt, with satellite communities around the rim, their growth limited by the ocean, physical topography and resource limitations. Chief emphasis might be placed on an efficient conurbation.

(b) Another alternative might promote other cities to offset the dominance of San Juan on the island.

(c) A third possibility might be to encourage development in eleven to thirteen subregions on the island, or the growth of small towns generally might be encouraged.

8. Goals chosen would influence public investment priorities, decisions on transportation network, port development, water and land allocation policy, land use controls, labor training, tax incentive policies, housing, urban renewal, site acquisition and industrial programs, etc. Although the government is concerned with the problem, there is still no unit to adequately explore the investment implications, resources, cost, implementation, and the means of fulfillment.

9. Resource limitations may place obstacles in the way of existing growth patterns. Water shortage, for example might influence growth, and it would be shortsighted and costly not to examine the government's objectives relating to industry and the regions where public investment programs might bring about development.

10. Basic policy could be subject to periodic review and to rather simple processes of amendment. However, public development agencies need some guide lines within which they can operate, otherwise they are apt to theorize concerning desirable patterns of development. Indeed, the same frame of reference seems to be felt by private developers.

11. Capital budgeting is the principal tool of planners for scheduling the investment of overhead capital. On the national level this device is too gross to guide general regional development patterns effectively. It is almost impossible to tell what the combined departmental development programs are for specific regions and communities, and whether they are balanced. Disproportions and omissions may crop up at the local and regional level. To build ports without adequate feeder roads, power installations without consideration of user equipment, or industrial plants, and other development projects without taking account of sewage and water facilities, housing, schools and shops can be demoralizing as well as inefficient; yet these misallocations crop up in development programs in many parts of the world.

12. Regional capital budgeting is a more refined control over public investment, and thus of urban development. Other tools, such as land use regulations, taxes, insurance and training programs may encourage certain types of private developments. Public investment of overhead capital must spark private development, influence its location, expand the market and synchronize interdependent activities, and become the fulchrum for implementing national and local plans that otherwise would run the danger of remaining only intentions or hopes.

13. The process of preparing regional capital budgets will not be as formidable as may appear likely at the outset. Different departments may break down their proposed programs for localities within designated regions. Regions can be determined on the basis of administrative convenience and programming requirements. Data should be available of localities or city regions and these city regions

should be grouped within as small a number as possible of administrative or development regions to reduce the requirements for staff. With the data organized, the proposals of different departments could be summarized for a forthcoming year and reviewed as to reasonable balance. Maps to record this information would aid the process.

14. Proposals for capital development could be compared with local physical development plans and with national urban development plans to keep them in line with national urban development plans, goals, and timing. Capital budgeting can be time consuming, and a more careful analytical process can be introduced into the mechanics of capital budget decision.

15. Decentralization can be furthered by regional capital budgets. It is now restricted by shortage of local personnel, politics, and other difficulties.

16. One hazard in regional capital budgeting is the exertion of local pressures to alter decisions. But this would not be an unmixed evil; they may be desirable to serve such a role as local needs must have a place in comprehensive programs.

17. Corollary measures may be summarized as follows. On the national level, there would be need for analytical function associated with the formulation, implementation and amendment of the national urban development prospects, implications of alternative development goals, the anticipated physical development programs required in particular regions as a result of the introduction of new industries, ways of capitalizing on resource potentials or overcoming resource limitations, such as water shortages, in anticipation of possible economic development.

18. Another group of studies should involve the coordinating function, the implications for physical development of the plans and programs of line agencies. Plants for a port, for example, may significantly alter the priorities for roads, utilities, housing. Decline of certain activities may eliminate the need for a school or hospital. An efficient reporting system to feed this information to agencies is essential.

19. Vertical coordination will be required. Probable economic magnitudes and major policy decisions of the government will need consistent local and national plans. Regional specialists could be created to help local communities with their programs, to report on local problems and aspirations, to indicate serious obstacles, and to propose and to evaluate changes. Tasks multiply as local responsibility grows and devolution of authority must occur to increase the efficiency of operations. The local authority might be expected to assume responsibility for programming choices, executives, and technical assistance established by the central planning and line agencies.

20. In most developing areas the principal machinery for handling problems of development has been geared to national economic policy. Where urban development policy is considered systematically, it is generally on the local level. The main outlines of this planning model have been sketched with emphasis on the links, now missing, which might make certain urban aspects of national economic development work much better.

21. The model considers urban overhead capital as a strategic sector which warrants direct attention in the campaign for economic development. This would be accomplished through the use of national urban development plans. Similar plans might be made for rural land use. The proposal could then alter the content of plans, but the general approach and the regional budget mechanism would function in nearly the same fashion.

22. The section concludes with the paragraph:

"The linkage proposed for urban and economic planning follows naturally from the need or the opportunity to budget overhead capital. This is the basis for tying the national urban plans to the capital budget process. The role of the regional capital budgets would be to ensure more refined area analysis and programming and to supply a means for checking and for controlling the execution of national and local urban planning goals. Coordinating and analytical devices

can also be created at the national and regional level to feed back relevant information to these regional pressure points in the decision making process and thus help to improve the general performance. An advantage of the system is that it sets up some interlocking self correcting elements which adjust simply to existing institutions."

22. Section 2 reviews briefly the British new towns program as a planning tool for urbanization policy. The aims of the new towns policy are being gradually achieved, which were to build comprehensively planned citires to curb the growth of London and to provide a more effective pattern and method of urban growth. But there are still a number of problems requiring attention, such as overall urban planning, controlling the growth of the metropolis and synchronized regional development. Present policies have bben geared to London's growth and to special areas outside London, without considering sufficiently the question of how many new towns might be needed in Britain, and where, and when. Another problem is the prevention of continued expansion of a big metropolis such as London. The problem of administration is touched upon as an example of the difficulties of coordinating the policies of all ministries.

23. The importance of the new towns is that the British government found it necessary to consider the urban pattern of the country a matter of vital national interest. The policy reflected the contemporary concern with the scale of the metropolis, the pattern of urban development, its social, economic and military effects. A new towns policy offers a way of channeling peripheral growth of metropolitan areas, and for coping with special urban problems such as redistribution of population and economic activity, the handling of boom towns, and the reconstruction of blighted regions. One advantage is that such action creates a mechanism which raises some of the relevant questions concerning urban scale, location, to anticipate and correct disorders when they are perceived, to steer development to the most advantageous locations with minimum stress placed on existing resources. The policy may be expected to orient thinking toward significant issues such as skilled technical and managerial personnel required, the importance of adequate administrative machinery for resolving conflicting government policies, the most effective means of coordinating developing programs between and within regions, and the feasibility of applied research to improve existing practices.

24. Section 3 is a selected bibliography on specialized aspects of new towns.

HIB - GA : 22

Design as a political force. (Interiors, Apr. 1957, vol. 4, pp. 44-60, with illus.)

p. 260

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1. The International Cooperation Administration [or Point 4, etc.] directs a large share of America's technical assistance program to semi- or non-industrialized nations. Generally it is involved with small industries and craftsmen in order to raise the quality of their products, direct them on production, credit and marketing The broad objective is to raise the standard of living. In order to help nations relate their production to modern patterns of international trade, ICA turned to a group of designers. Russell Wright made a survey of five southeast Asian nations with the object of improving their trade by putting local producing units in contact with U.S. manufacturers and buyers, and arranged a large exhibition at the New York Coliseum for store buyers. ICA has renewed Wright's contract and the Taiwan government has set up the Handicraft Promotion Center he recommended.

2. Other design organizations surveyed other countries. Results often proved that it was easier to introduce entirely new elements than to change traditional ways. There was also the fear in some countries that mass production would eliminate control over the creation of products. In Israel, an attempt was made on the national scale to supply new products to the country that is now importing more than it exports. Specialized manufacturing appeared to be the answer for future use of skilled workers rather than trying to develop great industries for which Israel lacks the natural resources. A design office was set up in Haifa supported with counterpart funds by the American and Israeli governments until it can be self-supporting. The American designers are working to give the client advice in marketing and product planning, in the skills in detail and the ability needed to coordinate plans.

3. In Greece, Lebanon and Jordan the largest gap in the economic systems was the lack of an organized system of outlets to market goods. Offices were established to collect the best native products and to maintain quality standards for export, principally to the U.S. They were to be principally showrooms to the trade and distributors to retail outlets. A Greek Productivity Center has set up a working committee to implement it.

4. Japan and Korea showed a tendency to accept Western influences in the design of products. Korea craft has deteriorated to the level were it will not attract Western buyers, and a program of technical training for craftsmen was recommended. Other countries are also producing cheap goods for the home market which could not be adapted to sale abroad.

5. In all surveys, national character was emphasized as the important selling value. Many of the countries cannot absorb a greater quantity of goods due to the low per capita income. Designers will be called upon not only to advise on the industrial value of foreign crafts in the world market, but to consider the national planning framework of each country and its relation to world trade.

Netschert, B. C., and S. H. Schurr. Atomic energy applications with reference to underveloped countries; a preliminary survey. Baltimore published for Resources for the Future, Inc., by the Johns Hopkins Press, 1957

HIB - GA : 22
p. 261

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711.2

1. The study, undertaken at the request of the Ford Foundation, offers possibilities for future developments in the realm of nuclear fission, with particular application to the circumstances of underdeveloped countries. Part I outlines the wide range of potential applications of atomic energy. Part II indicates in a general way the kinds of question that arise in evaluating each area of application. Study must be matched against the physical, economic and social environment, including comparisons with alternative technologies for performing the same functions. Such studies must be associated with the country's development plans and prospects. Specific studies need to be made in certain areas: supporting industrial and social structure for various applications of atomic energy, special type of education, effect of atomic energy on production and output, applicability to agriculture and industry, general effect on economy, international shifts in location of certain energy-intensive industrial operations, change in foreign exchange arising from fuel imports, capital requirements in a modernization program including electric power stations, etc., implications of nuclear power and radiation applications on regional patterns of industrial development, possibilities for regional development in processing food, facilitation of decentralization of small-scale development, implications of decentralization for associated social and cultural problems of adaptation, use of radiation genetics to produce new plant and animal varieties, potential gains in the country's food position, possibilities in medicine and public health inherent in the use of atomic energy, radioactive waste disposal, and many other problems.

2. Studies of this kind would have to be intensive, with field work in the countries concerned. Changes in industrial and agricultural techniques and in various patterns of development would have to be studied in unison by economists, engineers, agricultural technicians and others. There are also the immediate studies, such as cost range which is great, and the real value to the country or region in consideration of other technical developments and the development program of the country. In Asia, for example, one of the immediate possible uses of atomic energy is in grain deinfestation, radiation genetics, and plant physiology, but these need study for any particular setting.

3. Part III shows that a small beginning in the field of atomic energy has already been made in some countries by training in the U.S., by establishment of local training courses, and assistance in reactor building from the U.S., the U.K., and Canada, as part of the Colombo Plan.

4. Present programs for disseminating information deal with technical aspects, but provide no background for evaluating the economic and social feasibility of different nuclear energy applications. The inauguration of studies mentioned or outlined are considered by the authors to be the most urgent problems needing attention.

5. Summary of the Brookhaven Study, Appendix B, reviews the Study for an Asian Regional Nuclear Center, prepared by the Brookhaven National Laboratory, in 1956. It emphasizes the fact that it is a unique concept involving cooperation over so vast an area that there is no experience anywhere in the world of similar magnitude.

Thermal sea water power plant. (French economic and technical bulletin, published by the French Consulate General in the U.S.A., 1956, no. 7-8, p. 20.)

D
626

Dry

Complete text follows:

1. France is about to build in Abidjan the first power plant operating on the thermal energy from sea water. The principle of thermal power from the ocean is comparatively simple, and is based on the difference in temperature between two neighboring masses of water: warm water from the surface of tropical seas and cold water from the polar regions which remains stagnant and lies at great depths because of its heavier density.

2. The difference in temperature can be utilized by placing these two masses of water in a special thermal machine.

3. The idea is not new. As early as 1926, French engineers performed interesting experiments. In 1939 they succeded in operating in Cuba a turbine for several days solely from the thermal power of sea water.

4. These early experiences paved the way for further research which was begun in 1941 under the auspices of official French Government organizations. A special company was set up to proceed with the plant in Abidjan where the natural conditions necessary for such a project are readily found.

5. Tests have shown the advantages for industry that the plant will offer. In addition to the sale of electricity produced by the 7,000 kilowatts from the two groups, the plant will furnish large quantities of pure fresh water, produced by condensing steam from the sea water.

Kayanan, A. C. Casas-en-hilera. San José,

Costa Rica, 1955. 8 + 7 pp., plans
Text in Spanish and English.

E
728.3(72)

Humid

1. There is in Costa Rica, as elsewhere, a general desire to own one's home and lot which has led to several houses being crowded on lots intended for only one house. One cause was the high cost of land and another cause was the lack of proper guidance in both design and coverage of lots and in the construction of buildings. A proposed solution is the joining of two units, or row houses of 4, 6, 8 or 10 units. Row houses may be one or two story, or a combination. One story row houses produce densities of about 15 units to the acre, excluding areas for communal purposes. This type provides 80 - 85% as much yard space as twin houses in a development of 14 units per acre. Two story row houses may be planned at a density of about 24 units to the net acre.

2. Mr. Kayanan has designed a basic layout for row houses of not more than 12 units, in order not to give the impression of monotonously long and solid walls. The buildings are 2 stories high with end units having a section either one story high or two stories with a garage. Individual frontage is 6m. The depth of the house is 7 - 9.5m. including front and rear porches. The second story may be given more width by overhanging the floor on both sides, overhangs serving as protection for porches. Each interior unit has a lot of about 130 sq. m. with a 6m. x 5m. front yard for flowers and a 6m. x 7m. backyard for vegetables and poultry. End units may have lots with areas ranging from 175 - 270 sq. m.

3. The basic plan is a combination living and dining room with a movable cabinet partition, kitchen, front porch and front garden, back porch for drying clothes, bathroom, 2 bedrooms and ample closets. Space below stairs is for storage. Kitchens and baths are located for economy in plumbing. One alternate plan shows a garage and tool storage on the first floor and 4 bedrooms on the second floor. The garage can be playroom. The other alternate plan shows a large bedroom and bath on the first floor.

4. Material may be concrete, bricks and/or wood. Roofs may be concrete, cement-asbestos or galvanized iron sheets. All utility lines are placed along easements at the rear of the lots to achieve efficiency and economy in installation and neatness in appearance. Planting is included in the general layout, and recreational areas are part of the scheme.

5. The advantages of row houses are orientation which can be planned for cross ventilation; privacy with windows on only two sides instead of four, which is important when houses are close together; economy due to each house having one less wall. Utilities and sidewalks are cheaper when two houses share the same. And finally, the row house is not foreign to Costa Rica where single dwellings have often become attached to others built close by.

HIB GA - 22
p. 264

Kayanan, A. C. Construccion de casas de "bahareque modular." San José, Costa Rica, 1955. 10 - 9pp., plans.
Text in Spanish and English.

E
728.3(72)

Humid

1. "Bahareque is a system of house construction popular in rural areas and small towns all over Costa Rica. The author proposes one method of improvement after study of local conditions and testing one house by actual use, although he readily admits the possibilities of other improvements. His aim has been to achieve modern and logical functional design, and efficient and practical techniques of mass construction in order to make better houses available at lower cost to more people. The author says that one experimental house is not sufficient; it would be desirable to build a small pilot community of such houses.

2. "Bahareque" construction has many variations in Costa Rica, the two most common being the "Bahareque Frances" and the "Bahareque Relleno." The following descriptions are quoted from the text.

3. "The Bahareque Frances, which is the cheaper of the two and which is generally considered less desirable, consists of small vertical posts installed about 80 centimeters (about 2' 8") apart and horizontal strips of cane that are fastened to the posts on both sides, either by tying or by nailing. The space between the strips of cane are filled with a mortar of mud, stones and pieces of broken tile. Both sides of the walls thus formed are covered by some kine of lime or mud and then painted with several coats of whitewash. "Bahareque Relleno" is done in the same general way, except that sawn wood strips are used in lieu of the cane strips, and the mud fill is mixed with lime and is compacted by pieces of broken tile inserted carefully in herring-bone pattern alternating between the rows of wood strips. Both surfaces are then covered with lime plaster."

4. Summary of Proposed Incvations

"The "Modular Bahareque" proposes the following inovations in the current system of consturction:

a. The house will be designed and constructed in modular panels, instead of complete walls, thus making possible "flexible" structures which can assume various shapes, sizes, and details. These panels are to be of different types - wall, door, and window units (with or without lattice), lattice units, etc.

b. "Bahareque" panels will be constructed while they are lying horizontally, instead of vertically, in order to effect ease, economy, efficiency and excellent quality.

c. The parallel wood or cane strips will be place diagonally, instead of horizontally, first on one side and then on the other at a right-angle direction. This will add tremendously to the strength and rigidity of the panels and make the placement of the "bahareque" mixture much easier and, therefore, cheaper.

d. The "bahareque" mixture will be placed after the wood or cane strips have been attached on one side only, instead of on both sides. This will insure rapid and thorough compactness of the mixture for the panels.

e. The house need not be constructed in one continuous operation as is usually done. The owner's spare time may be utilized profitably in the making of the various modular panels needed which are stored for the purpose of setting them firmly. When there are enough for the proposedhouse, the panels may be assembled and erected rapidly and easily with the aid of friends and neighbors.

f. The plastering of the walls will be done after the panels have been installed firmly in place. The plaster will contain sufficient fibers, etc., to insure against temperature and moisture cracks.

Illustrations

Attached to this Report is a set of 7 sketches, Sheets numbered from 1/7 to 7/7, showing:

a. Basic floor plan of a Modular House of Bahareque; (Reproduced)

b. Two elevations of this house;

c. Variations of the basic floor plan; (Reproduced)

d. Types of modular panels;

e. Cross-section of a modular wall unit and types of connections for the units; (Reproduced)

f. Suggested sanitary facility - a bath-and-laundry combination; and

g. Typical grouping of Modular Houses of Bahareque. (Reproduced)

Explanation of Design

5. "The house design and construction, which are in terms of modules of 1 meter, are predicated on the need for flexibility both in the initial structure and in the expanded house. In other words, the initial structure could be designed to assume a variety of shape, size and detail - depending on the actual needs and resources of the family, character of the ground and environmental conditions. The initial structure may be expanded easily and inexpensively by merely enlarging or adding a room or rooms or by re-arranging the partitions and wall openings. The old panels may be used over and over again.

6. "The floor may be of concrete, or some other type of hard material such as compacted and treated earth, brick, etc., with the edges raised in the form of a low wainscoating (about 20 cm. or 8" above floor level) to act as a base for the modular panels. The roof may be of corrugated asbestos or galvanized iron sheets, tiles, or treated thatch on wood or bamboo framework. The windows need not be of glass.

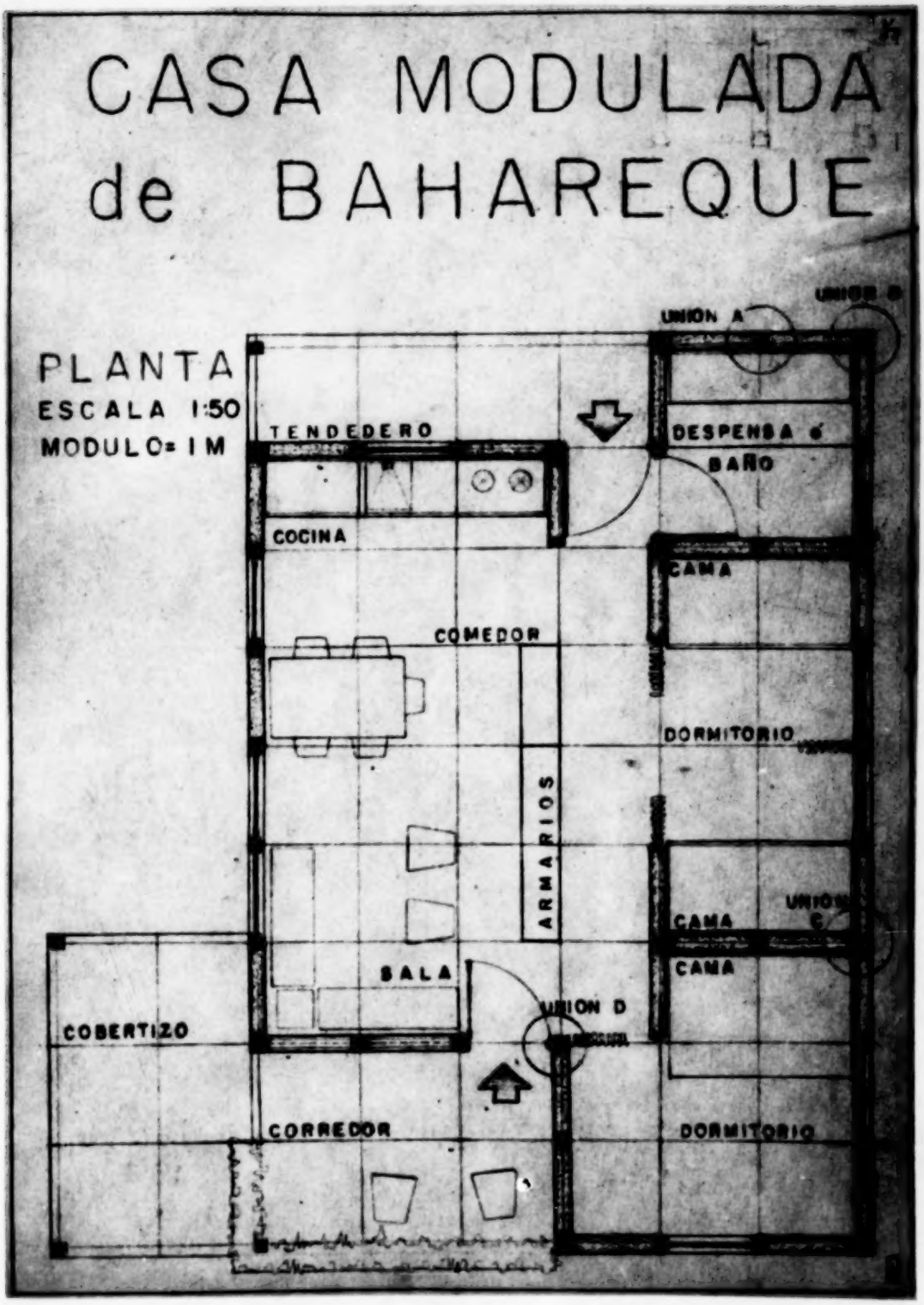
7. "The wall and window panels are 1.00 m. by 2.40m. The door panels are of the same width but slightly longer by the height of the wainscoating. A typical wall panel consists of a frame with 2 intermediate cross-pieces - all of 2" x 4" lumber with 2" x 2" tongues nailed all along the 2 vertical edges. The bottom edge of each panel has slots to accommodate short dowels which have been previously embedded at pre-determined intervals on top of the wainscoating. The top edge of a panel is designed to receive the rafters or trusses for the roof. These rafters and trusses will serve also as horizontal braces for the wall panels when erected.

8. "The combination of 2" x 4" and 2" x 2" lumber pieces to from an "L" section on the long edges of the panels lends itself easily to a variety of convenient and adequate panel connections, namely: butt, "L" or corner, "T" and cross joints (as may be seen on third illustration) by simply adding another 2" x 4" or 2" x 2" piece. In some cases, as in an "L" joint of a wall panel and a door panel, a fascia board (1/2" x 4") may also be needed for trim. The assembly of all panels may be done by nailing.

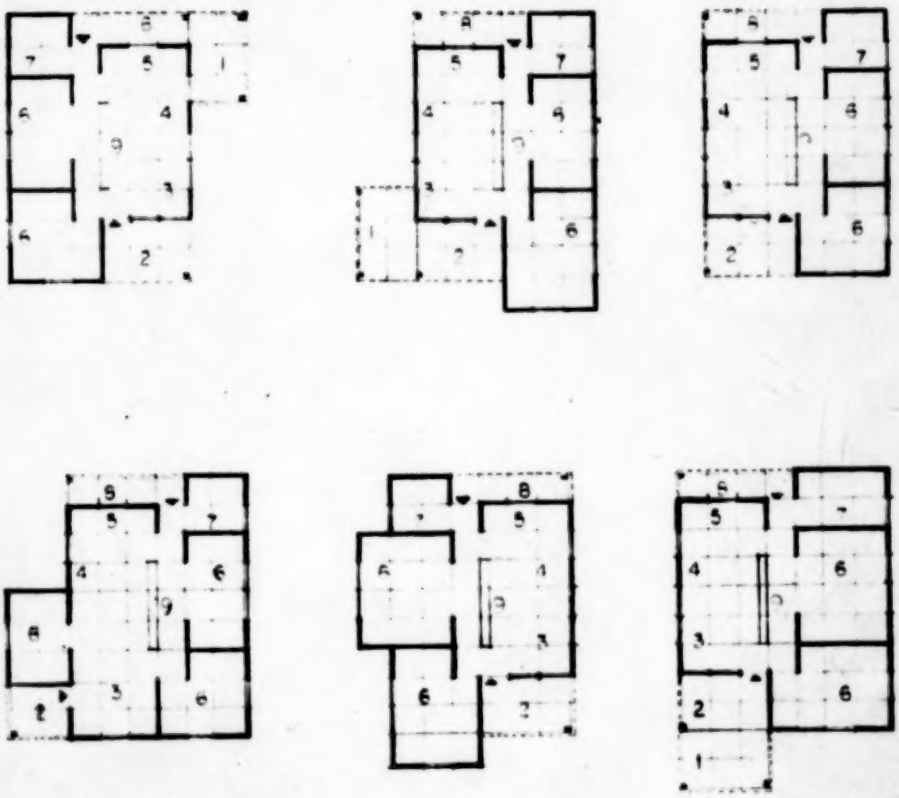
9. "The few types of modules shown on Sheet No. 4/7 and possible combinations of panels (see first & second illustrations) indicate the variety of designs which could be achieved. Jalousies or "persianas" may be substituted for the latticework on the upper part of the panels, especially in hot and humid regions of the country where there is need for good ventilation and effective protection from heavy rains. Instead of horizontally pivoted sashes, vertically hinged ones may be used, although the former give far better protection from the rains.

10. "To reduce the weight of wall panels, the "bahareque" mixture may be made more porous with the use of cinder aggregates or the addition of straw. Experiments, however, have to be conducted to determine the effect of these porous materials on the durability, strength and permeability of the panels.

CASA MODULADA de BAHAREQUE



VARIANTES del TIPO BASICO de CASA MODULADA de BAHAREQUE



LEYENDA

1 COBERTIZO
2 CORREDOR
3 SALA
4 COMEDOR
5 COCINA
6 DORMITORIO
7 DESPENSA
8 TENDEDERO
9 ARMARIOS

ESCALA 1:200

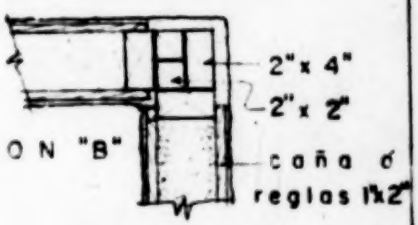
NOTA:

OTRAS PLANTAS QUE VARIEN EN TAMAÑO Y DISTRIBUCION PUEDEN HACERSE USANDO EL MODULO INDICADO.

CORTE de UN MODULO PARED

TIPOS de UNIONES

UNION "A"



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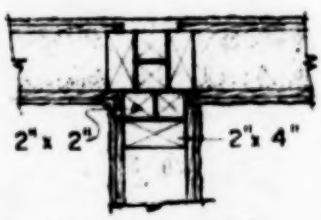

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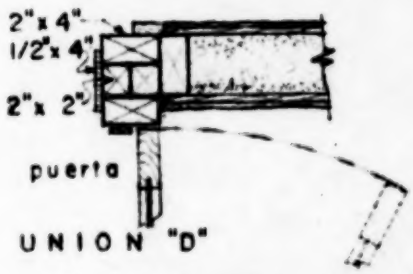
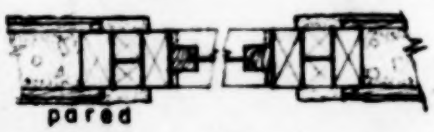


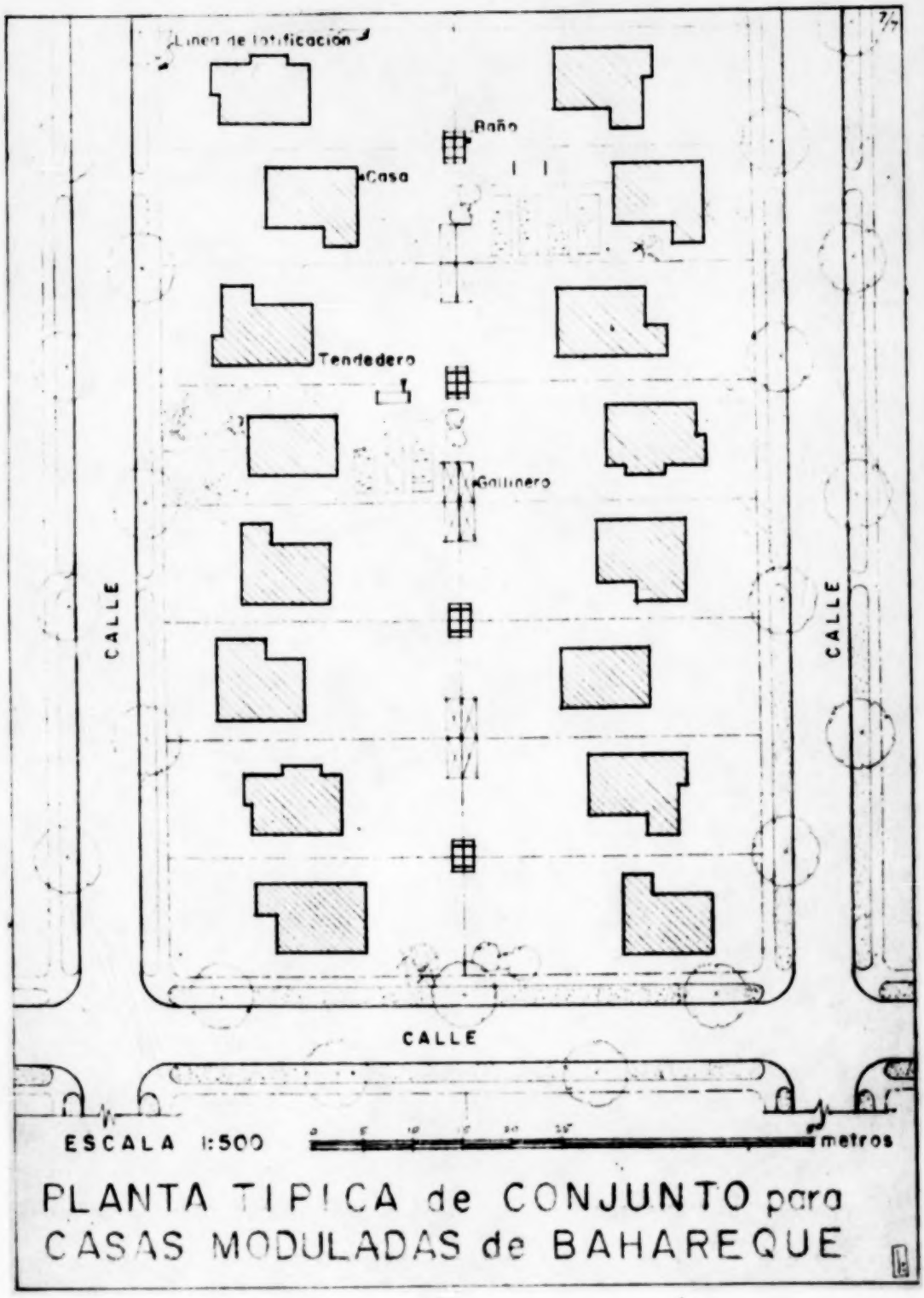
UNION "D"



CORTE de VENTANA

UNION "E"

CASA MODULADA de BAHAREQUE



PLANTA TIPICA de CONJUNTO para CASAS MODULADAS de BAHAREQUE

11. "The bath may be in the house or in the backyard. Included in the set of illustrations for this Report is a sheet showing a plan, section and perspective drawing of a bath-and-laundry combination which utilizes the "Modular Bahareque" method for its walls and demonstrates how the limited water supply in rural areas may be ingenously economized for maximum practical purposes. Used water from the shower and the laundry tub is re-used to flush the squat water closet. Four of these sanitary units could be grouped at the juncture of 4 lots (as shown on last illustration), thus economizing also on water and sewer connections.

12. "Several types of the "Modular Bahareque" houses may be grouped to achieve interest and avoid monotony. The houses may be staggered by varying the depth of the front yards to obtain privacy and better circulation of air thru the block. Last illustration shows this desirable arrangement and also indicates several possibilities of developing the yards for gardens, chicken coops, etc.

Method of Construction

13. "The finished framework for a wall panel is laid horizontally on a flat surface on the ground. The strips of cane or sawn wood are nailed diagonally on one side of the panel and then the framework turned the other side up to receive the mixture of mud or clay, lime and other aggregates. A thin layer of sand should be between the framework and the ground to insure a good surface for the panel. The mixture should be of such consistency as to make possible its easy manipulation with the feet while it is being compacted in place. Once the correct amount of the mixture has been sufficiently compacted, other strips of cane or wood are nailed to the framework in parallel and diagonal arrangement but in perpendicular direction to those on the other side of the panel. At this stage, pieces of broken tile may be embedded in herring-bone patter. After this is done additional amount of the mud or clay mixture is applied until the strips are fully covered. Then a thin layer of sand is spread over the surface and worked into the panel. After a while it is stored horizontally under a shed to harden and dry.

14. "When there are enough of the various types of panels to make the house, they are assembled with the aid of friends and neighbors over a previously prepared floor. The panels are adjusted in place and connected to the wainscoating by means of slots and dowels and held in correct position by temporary bracings. Panels are nailed to each other as they get erected. Then the rafters or trusses for the roof, which should have been prefabricated also, are installed with nails or bolts. When the entire structure is sufficiently rigid, the temporary bracings may be removed.

15. "The plastering of the assembled panels may start when the roof is already installed - not before, in order to protect their surfaces against rain or the intense heat of the sun. The mixture of mortar to be used in the plastering should be of good quality and should contain enough fibers to prevent temperature and moisture cracks. Sufficient time should be given to allow the plaster to dry and cure before any paint is applied. The paint may be of whitewash or some kind of water paint.

Advantages

16. "This proposed "Modular Bahareque" method of construction has, among others, the following advantages:

a. It will make possible the utilization of a family's spare time in constructing its own house by "installment";
b. It does not need expensive equipment nor the outlay of a large sum of money at one single time;
c. It does not need expert hired labor so long as some kind of competent and adequate training and supervision is provided;
d. It can be used to build a house to fit any size of family, any income, any type of terrain or any environmental condition;
e. The house can be enlarged easily or remodelled without waste of material, effort and time and too much expense;
f. It is cheap and practical; and

g. Because the owner can construct and expand his own house, he develops a certain pride in his own work which, in turn, makes him a more desirable and a more valuable member of the community in which he lives"

17. In closing, it is recommended that panels be made to test their strength, economy, workability and adequacy. A pilot community project on a desirable site should be undertaken as an aided self-help enterprise. Continuing studies need to be made on both designs and methods of construction, as well as community organization. Householders are helped by this scheme to build and maintain their own homes by providing, from savings, part of the cost of the land, materials and perhaps skilled help, and by doing some of the construction in cooperation with others. Local administrative machinery will have to be established with competent personnel who will take into account the individual character and tastes and way of life of the people being housed.

Leonidas Trujillo Molina, Rafael. The problem of the dwelling-houses. [Ciudad Trujillo[, 1955. 20p., illus.

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728.3 (729)

Humid

1. The booklet is a brief and general account of the ambitious program of the present regime in the Dominican Republic to replace old shabby houses of the poor class with better housing. The state recognized not only the unhealthful factors of substandard housing, but also factors of promiscuity and the slackening of moral fibre of residents. Many houses, the booklet states, were donated to needy families. A system of conditional sale on a loan basis was instituted so that, by very small monthly payments, low income families may acquire title to comfortable homes. Workers have invested small savings and part of their salaries in the purchase of their own homes.

2. In order to house persons drawn to industrial centers, the state has arranged for the construction of "Social Improvement Suburbs" in all the important cities of the Republic. It has also dictated measures by which improvement could be made in all aspects of country life, including programs to raise the economic, social, and cultural level.

3. The booklet concluded with 15 pages of photographs of recent housing developments ("new and lovely suburban homes") without giving their location, designer, plans, or any specific information.

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Masalah bangunan, the official journal of the Regional Housing Centre, Bandung (issued quarterly), vol. 1, no. 42pp., illus.
Test in Indonesian and English.

1. This first issue contains articles on traditional housing in Timor, the soil mechanics laboratory in Bandung, people's housing in Java, and portland cement.

2. The editorial written by Professor Hadinoto, Director of the Regional Housing Centre is reprinted herewith in part:

"The Regional Housing Centre for the Humid Tropical Areas of South East Asia came into being in March of 1955. The first year's work was largely confined to organizational matters, collecting, studying and classifying a wide range of information on relevant subjects, and the training of personnel. A limited amount of experimental work was put in hand and since the first of this year steps have been taken to accelerate the programme.

3. "The major fields in which experimental work has been carried out are, (a). studies of pozzolan/lime and pozzolan/portland cement admixtures, (b). preliminary socio-economic surveys of traditional housing in various parts of Indonesia, (c). Soil Stabilization, (d). testing of light weight roof structures and various types of nailed joints.

4. "In addition a pilot survey of bamboo mats as used in house construction has been made. Statistical analysis of existing timber test data has been started.

5. "The library and documentation departments are beginning to get well established and it is anticipated that within a few years we will have built up a truly comprehensive library on building technology and allied subjects. A library loan-system, micro-film service and abstracting service will be brought into being in the near future and it is hoped that other countries of the Region will take full advantage of the facilities that will be offered. "

Mumford, Lewis. A new approach to workers' housing.

(International labour review, Feb. 1957, vol. 75, pp. 94-103. Also reprinted.)

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1. In reviewing the historical background of workers' housing, Lewis Mumford notes the inception of improved conditions in England during the middle of the nineteenth century in reaction to the overcrowded and insanitary quarters that were built to accommodate the growing mass of industrial workers in the new manufacturing cities. The movement began in New York City with the building of model tenements provided with quarter of the city. Another solution was the attempt to provide a better urban environment on cheap land in nearby countryside as instigated by industrialists such as Robert Owen, Sir Titus Salt, the Krupps at Essen, Lever at Port Sunlight, and Cadbury at Bournville. These sought to bring back into the industrial environment some of the spaciousness and natural beauty that most villages had possesed, and that had disappeared in the industrial town. But these improvements were not effected simply by better architectural design, they required cheap land, restriction of profit on the investment, the economies of large-scale building, the lowering of the cost of maintenance by continued supervision. These garden villages popularised low-density standards, but they were not profitable enough to cause any great emulation by private enterprise; nor did they provide any general solution to the housing problem.

2. In analyzing the economic base for adequate housing for workers there seems to be no solution to the housing problem when conceived merely in terms of low-cost housing, but only in terms of the total community. Bad housing is not a disease peculiar to the lower income groups. However, Lewis Mumford proposes a new approach which follows in his own words:

3. "In terms of a short-run programme there is no satisfactory way of providing good workers' housing or, for that matter, housing for any except the upper 10 percentile in annual income. Attempts to meet the relatively low level of the industrial workers' income by providing minimal quarters, if made for profit, produce the cramped overcrowded slums or the equally depressing and overcrowded suburbs that have characterised the growth of cities all over the world during the last two centuries. Even when state aid is enlisted to raise the physical standard of workers' dwellings and provide them a rent they can afford, the results have been uniformly unsatisfactory - and unsatisfactorily uniform. No efforts at rationalising the design of workers' houses and cheapening by technical devices the costs of contruction promise by themselves any substantial advance.

4. What we need today is a new approach to this problem: not the negative one of correcting this or that immediate evil or difficulty but a positive one that will create domestic quarters which, by their planning and design, will restore to the worker social and personal initiatives that are either ignored or repressed in the routine of his daily work. The most important fact to recognise is that housing cannot be reduced to the physical provision of shelter. The dwelling-house, today more than ever, is the centre of family life and all its biological and social activities, eating, sleeping, mating, nurturing and educating children. To the extent that regimentation and automation are on the increase in every other sector of life, variety, autonomy, adaptability to many occasions, and personal initiative, must be restored to the functions of the dwelling-house, if it is not to be - like more than one collection of state-aided multi-storied buildings erected during the last generation - little more than a collectice slave-barrack.

5. Now the house shares many of these domestic and cultural activities with other public institutions: it is not an insulated cell. Hence it is the total environment and not just the domestic nest that must be included in the concept of housing. The neighbourhood, not the individual structure, is the new unit of housing; and once the neighbourhood is conceived in terms of a whole community with all the varied needs of life from infancy to old age, with all the diverse psychological and occupational types that make up a mixed community, the narrow choices that are offered by the opposing schools of housing must be dismissed as sociological or architectural fantasies, if not nightmares. The post-war Levittowns in the United States, with two or

three housing types and a uniform population with respect to age and economic status, are socially speaking, monstrosities. But so, equally, are the new workers quarters erected under the specious banner of modern architecture around many industrial cities. They are. as it were, the architectural progeny of Cyclops and Procrustes, lacking any sense of the human dimensions.

6. The problem of workers' housing, when one examines it rigorously, dissolves into the problem of community housing in general; and that is a function of neighbourhood design and city development. What is needed is the raising of living standards to a norm suitable for every income group and every occupation. Once adequate biological and social criteria for housing are set up, they apply to every income level, just as standards for sanitation and disease prevention apply. Such differences as one may allow in new housing to provide quarters for the higher-income groups become mainly differences in the amplitude of space, not in the kind of accommodation. This normalisation and equalisation have been going on rapidly all over the world during the last 30 years, but the process is particularly marked in advanced industrial countires like Britain and the United States where the effective disappearance of household servants has reduced all households, except a swiftly dwindling residue, to modest dimensions allowing a maximum of self-service.

7. There is every reason to think that this movement toward normalisation will continue and expand; that durable housing and city building will, in the realm of capital investment in durable consumers' goods, perform what mass-reproduction and rationalisation do for more ephemeral commodities. As the implications of this fact become recognised, workers' housing as a separate category of social effort will disappear; and, because of the long-term investment needed to produce housing and neighbourhooks designed for stable occupancy, public aid in increasingly large instalments will be demanded for all housing. This public aid will be invoked for three main purposes.

8. First: in now overcrowded areas, to liquidate excessive land values in public projects; and so to base new housing plans not on values produced by congestion but on those that correspond to a desirable population density. This liquidation and reduction in new housing developments would place big cities on a par with smaller uncrowded communities. Once the State assumed the loss in values, future plans could be based on securing social benefits, not on perpetuating economic liabilities. Second, to provide as an essential part of every family dwelling sufficient space for a small garden and the easy care of young children, varying in area with the size of the family; at the same time, to make sufficient public provision for open space for walks, parks and playgrounds, linking the dwelling to other neighbourhood facilities, from the school to the cafe, the health clinic, the cinema and the local market. Third, to sink sufficient capital into housing investments that will not be amortised for many generations, possibly 150 to 200 years. While preparations for mass extermination (still too politely called war) absorb the productive efforts of even rich countries like the United States, such a programme may seem impossible, but if once these suicidal plans and these irrational preparations were brought to an end such a long-term programme of urban renovation might prove as beneficial to the economic system - indeed as imperative - as to the cities themselves.

9. Workers' housing built today in an attempt to meet minimal standard of health and decency is already from a social point of view obsolete; and it will become even more so, long before it is physically ready for replacement, if living standards and productivity continue to rise and if leisure continues to make consumptive activities ever more important. In contrast, housing that has been built to meet a desirable civic and human norm, as in the British New Towns, with relatively low density of occupation (100 per acre or less in existing cities, 40 to 80 per acre in new communities) will remain handsome and livable for two or three hundred years or more like Place Vendome, the Crescent at Bath, or even more venerable dwelling places, like the colleges at Oxford

and Cambridge. In the long run, the only cheap housing is good housing, that is housing generously conceived in itself and set within a handsome varied, many-sided communal environment, too livable, indeed too lovable, to be subject to early blight. Once housing is conceived as the most important element in a long-term public investment in a durable urban environment, current methods of providing workers' housing will be seen for what they actually are - complicated and disastrously expensive evasion of the real problem, the problem of creating an urban form that corresponds to the needs of our age and expresses its potentialities. In short, housing is inseparable from city building. In both arts one must overcome the illusion that equates cheapness with low first costs; particularly when this brings with it poor facilities, depressing living conditions, and high charges for maintenance. What counts is not first costs but final costs, reckoned over the total lifetime of the building. The most expensive buildings, both socially and economically speaking, are the slums. The cheapest buildings ever erected in Europe were the cathedrals. That is the clue to good housing."

Simey, T. S. A new capital for the British West Indies. (Town planning review, Apr. 1957, vol. 28:1, pp. 63-70, with maps.)

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711.432 (729)
Humid

1. The need for a regional organization of a political kind to serve the British West Indies has been recognized for the last ten years or more. Discussion has taken place steadily concerning the ways in which this organization might be established, its functions, and the center from which it would perform. This last, the geographical problem, has been most difficult as the islands extend over a thousand miles of sea and vary greatly in political and ethnological character. A recently appointed British Caribbean Federal Capital Commission was charged with recommending the three most suitable islands for the capital, in order of priority. The Commission also felt called on to recommend in general terms where the capital should be on these islands. They included relevent evidence relating to communications, convenience and cost, and the effect of the capital upon the island chosen.

2. The Commission agreed that the capital must be a 'federal shop window', typical of the British West Indies, and an affirmation of the history and traditions of the Islands. It must offer good cultucal amenities and social services. The Commission was against building of an entirely new town. It thought the Capital should be situated in an existing base town, quite distinct and not a suburb. Three towns were chosen: Bridgetown, Kingston, and Port-of-Spain in that order. On the basis of physical planning, the Commission showed that Bridgetown has advantages over the latter two towns, which are situated in relatively hot and sheltered sites, hemmed in by mountains so that development would be costly on the slopes of hills. Bridgetown has two possible sites for expansion and the benefit of trade winds.

3. After this, the report of the Commission entered the controversial territory of political and social problems, with observations somewhat unpalatable to the inhabitants of certain regions. Althrough administrative considerations were of chief importance in the deliberations, other matters were given serious thought, such as the relative size of Jamaica, Trinidad and Barbadoes.

4. A variety of bodies already exist in the West Indies, such as the Caribbean Commission with headquarters in Port-of-Spain, and others will be likely to establish headquarters as time goes on. Experience of existing organizations could have aided the Commission in its decisions, but there is no evidence that information was drawn from such organizations, and this report considers it rested its conclusions more on opinion and notions of color and corruption, than on fact. Organizations and institutions now operating would have had valuable views to express on the relative convenience of the various islands, communications, social amenities, technical services, the availability of secretarial staff, etc., all pertinent to the choice of a federal capital.

Alcock, A. E. S., and H. M. Richards, How to plan your village. N.Y., Longmans, Green and Co., 1955. 60p., illus., plans.

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1. The authors were formerly officers in the Ministry of Local Government and Housing of the government of Ghana. They have written their booklet for villagers in many parts of the world who are asking for help in planning their villages. The explanations are in simple words for those who do not understand English well and for those school children who will be the villagers of the future. The story is illustrated with line drawings and the text is about a young man Kwame, who has returned after study abroad to the village of Pontukrom in the Golo Coast. He was made chairman of the committee for village improvement. First Kwame gave talks in a classroom where he could draw on the blackboard and explain the maps, showing what contours are and how they look and where houses should be placed for best drainage.

2. Kwame explained the difficulties in planning for a hilly site, showing the steep streets, expensive houses, erosion, etc. He then explained the advantages of using the same site, but planning according to contours, with less expense. Next, Kwame, described how important it is for a village to have room for expansion, pointing out the dangers of building on the other side of a main road which causes traffic deaths to people and animals. Villages should not be too long and thin, but contained within walking distance of market, church or school.

3. Roads were discussed by Kwame in chapter two with reference to the building of a new town. A village could be placed away from the main road, leaving a strip of land between road and village to be planted as a buffer for dust, etc. If a village had to be built on both sides of a main road a by-pass road should be constructed with a green buffer strip of land between it and the village. If a main road already passed through a village, there should be a regular stopping place for lorries, with trees planted to make a small market. When a road has to be carried over a hill, it should be placed on the easiest slope. Curves in roads, and hill tops could be hazards and Kwame showed the villagers how to eliminate part of the danger by widening road bends and cutting a new road over a hill. The matter of keeping roads in villages is discussed and Kwame explained that it was better to have a few roads for maintenance, and to have several lots served by one road. These matters amply illustrated with simple diagrams.

4. Kwame pointed out bad examples of soil erosion in the village and the dangers to humans of falling into the pits and drowning as people sometimes do. He showed how to construct drains in hard ground and make the road slope toward them. Planting could also help keep the soil on some of the roadsides. Around the houses many of the compounds had been swept as ordered by the sanitary authorities, but this had caused erosion, and Kwame advised planting to restore the top soil and paving with concrete or stone. Tree planting was advised along the streets for beauty, shade, and fruit.

5. Having spoken about the village as a whole and its roads and drains, Kwame then told the people how to plan some of the bigger things. Lorry (or truck) parks should not be built at the side of a main road but some distance away from it. There should places for petrol pumps, latrines, offices and a bar or two. Markets would be next to the lorry park. The simplest was ground planted with shade trees with a fence or wall around the market so that the inside could be used for stalls. Finally, the stalls could be covered with roofs.

6. Near the lorry park and market, there ought to be a small work area for fitters, carpenters, etc., that would be arranged in stalls like the market. Rainwater could be collected from a sloping roof and stored in a central tank.

7. There should be a football ground or area for games in every village.

8. Water supply should come, Kwame explained, from a stream before it passes through the village, and people should not be allowed to bath or wash clothes above the drinking water point. Water used for drinking should be boiled 20

Alcock, A. E. S., and H. M. Richards, How to plan your village. -2

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minutes. The method of damming a stream and piping water was illustrated for cleanliness and for water in dry weather. Wells could be drilled and water stored. The top of the well should be lined and surrounded by a concrete platform and drain. Rain water is a pure source of supply if it can be collected in a covered tank.

9. The booklet concludes with Kwame's success in replanning Pontukrom by meeting with the village committee and making a new plan that was approved by the local authority.

10. Each page of text is accompanied by a simple plan or line drawing.

Sutherland, Alasdair C. Report on school on village planning. Accra, Ghana, Dept. of Town and Country Planning, Ministry of Housing, 1957. 31pp.

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Dry

1. The report describes a pilot course at the Rural Training Centre, Panfukrom held early in 1957 which was probably the first of its kind in Africa. The school was run jointly by the Department of Social Welfare and Community Development to allow people who already had some experience in village problems to acquire sufficent technical skill to be able to help villagers to improve, develop and plan their villages. Students were selected to serve as assistants in further courses. There were government junior officers from the Department of Social Welfare and Community Development, from the Department of Rural Housing, and from the Department of Town and Country Planning.

2. The aim of the course was:

1. To devise a workable syllabus
2. To try out the organisation of the course
3. To estimate a suitable length for further courses
4. To try out various teaching techniques
5. To find junior staff suitable for assisting on further courses.
6. To determine the ratio of staff to students.

3. The Staff consisted of one qualified Planning Officer and one Assistant Planning Officer, the resident staff at the Rural Training Centre, and a number of visiting lecturers. For future courses the following staff is recommended:

1 Qualified planner in charge
2 Draftsmen to help in practical work
2 Assistant mass education officers or assistant community development officers to assist in field work
1 Surveyor-draftsman for practical surveying.

4. 20 Students attended the course. They had little experience in preparing layout plans for villages. Eight weeks were adequate for village development but not for village planning. The alternative is to extend further courses to 12 weeks, or for the students who have to prepare village plans, to submit them with their social survey to the nearest planning officer for criticism.

5. The two villages of Panfukrom and Techem were visited and studied, the cooperation of the inhabitants having been enlisted before the start of the course. Practical work was arranged so that students were introduced to the problems of village development and methods of teaching them. There was a social survey of a small village, and a layout plan of a new village for some 500 inhabitants. Teaching overlapped, but the following ten subjects were taught concurrently: draftsmanship, building construction, self-help schemes with visits to projects, rural housing, social surveys, planning surveys, village imporvement, village development, village planning, and report writing.

6. Visual aids were used as it is essential that the planner explain his plans to the villagers, many of whom are unable to read plans. Outdoor and indoor sand tables were used for layouts of projects, the sand could be sprayed with color to illustrate topography, and houses could be set about. Models of buildings were used to a greater extent than models of village layouts. Posters were prepared and distributed to the students. Working drawings were prepared and distributed to the students. Photographs could illustrate types of buildings, etc. Flannelgraphs were useful in explaining planning to villagers, and films were also popular in illustrating the dangers of bad sanitation and unhealthy living. Regular film shows were run for both students and villagers; they were well attended. Entertainment and newsreels were also included in the cinema shows.

7. Examinations were given in the various subjects and a final exhibition of students' work was held at the end of the course.

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8. A two day special course was given for 24 students and one tutor from the Department of Sociology, University College of Ghana who visited the school.

9. The report concludes: "The short course is an excellent method of spreading the basic ideas of planning and community development. There would probably be quite a good response to a proposal to run a short course of this type for councillors and local authority officials in conjunction with the next village planning school. Once the school is established the running of a short course of this type would involve comparatively little extra work. This however should be held towards the end of the village planning course so that the councillors can have an opportunity of seeing the work which the students have completed."

Great Britain. Building Research Station.
Colonial building notes. Watford, Herts., Eng. Illus., plans. No. 1, June 1950 to date.

N
69:061.6

A useful series of illustrated notes on the design and construction of buildings in various tropical regions. Pertinent information on current developments in city planning is also included. Data is sufficiently technical to have value for the architect and builder.

HIB GA : 22
p. 283

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United Nations. Bureau of Social Affairs.
First report on the current activities of the United Nations, its Regional Economic Commission and the specialized agencies in the fields of housing, building and planning. N.Y., 15 May 1957 38 6pp.

1. The first part of the report reviews activities of the past, and indicates future lines of work. In noting technical assistance rendered various countries, it is pointed out that a more complete geographical coverage with respect to countries of the Middle East and Africa is desirable. By arrangement with the Lebanese government, services of the planning expert now in the region may be made available for short periods to other governments in the area. It is hoped that a regional consultant will be stationed there whose mission would be to assist in developing a program of international cooperative effort and to coordinate research and pilot and demonstration projects.

2. Summary of proposals for 1957-59 included the following:

Concerted international action in the fields of housing, building and planning. Publication of an annual report. Regional meetings of experts on the financing of housing. Review of factors influencing building costs, the problems of capital investment and productivity, and emergency housing. Publication of a manual on stabilized earth construction. Current trends in environmental planning with special reference to regional land-use planning and the location of agricultural, industrial and residential areas, will be reviewed and the results published. Seminar on environmental planning and the location of industry in the ECAFE area. Seminar on rural planning in Latin America. Manual on village planning to be published. Publications on rational design of low-cost housing through experimental research, world housing conditions and programs, current trends in environmental planning, case-studies in regional planning and technical assistance in the fields of housing and planning.

3. In the ECAFE area continuing projects are: convening working parties of experts from member countries to review technical and economic problems on housing and building materials. Coordination at regional level of the work of various agencies. Collection and dissemination of information on technical problems of housing and building materials and related matters. Follow up action and reporting on the regional housing centers for the arid and humid tropical zones of the region. Further TAA cooperation to be sought. Cooperation of other agencies also to be sought. Work in consultation with governments concerned on the regional housing center advisory committee. Periodical review of the housing situation and housing and building programs in the region in relation to economic and social developments.

4. In Europe, continuing projects are the survey of housing progress and policies, assisting governments of the less industrialized countries to develop and expedite their housing programs, inquiry into industrialization of house building and the reduction of the cost of house construction, and the collection and publication of housing and building statistics. Attempts will be made to set the different elements of financial policy within a single framework, to examine programs for rehousing dwellers in houses unfit for human habitation, and to bring up to date the 1948-49 survey of The Utilization of Space in Current Types of Dwellings in Fourteen European Countries.

5. In Latin America, activities will be continued in concert with agencies operating in the field.

6. The Forestry Division will study wood resources and publish a chapter on Bamboo as a Building Material in Tropical Silviculture to be published in 1957 by FAO.

7. Activities of the International Labour Organization will conduct the following surveys:

Conditions of employment of workers employed by construction contractors who supply labor only in the less-industrialized countries.

Welfare conditions in the constuction industry in the less-industrialized countries.

Productivity in the construction industry in the less-industrialized countries.

Safety conditions in the construction industry.

United Nations. Economic Commission for Asia and the Far East. Survey of housing and building materials in Asia and the Far East, 1956. Bangkok, 1956. 116., illus., plans.

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691

1. The Survey consists of General review of the building materials situation, Country summaries, List of reference document, Metric conversion factors, and Foreign exchange rates.

2. A table summarizing building materials in common use in the various countries. together with explanatory notes is reproduced on the following pages. Climatic distribution is given as to whether the material is used in arid or humid areas or both.

TABLE 2

SUMMARY OF BUILDING MATERIALS IN COMMON USE

FOUNDATIONS

	Materials	Climatic distribution[a]	Urban or rural utilisation[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Concrete:	**Strip footings or Column pads**	**C.A.**	**U**	**Strong, lasting, versatile**	**Very expensive.**	——	——	
	Stumps, beams framing posts	**C.H.**	**U**	**Can sometimes be pre-cast; enduring, termite-proof**	**Expensive, require formwork**	——	——	**Often found cheaper than first-quality hardwoods**
	Blocks: solid or hollow	**C.A.**	**U**	**Can be cast on job in hand-operated machines**	**Usually more expensive than good bricks**	**Wider use of block-making machines**	**Development of major industrial production**	**Have outstripped clay bricks in popularity in Malaya. Extensively used in West Pakistan**
Stone:	**Boulders or random rubble**	**A**	**R**	**Inexpensive if locally available**	**Cannot be bonded. Necessitate massive walls**	——	——	**Widely used in hill regions, particularly in India and Pakistan**
	Coursed rubble, Ashlar	**A**	**B**	**Strong and impervious to water erosion. Attractive appearance**	**Relatively expensive in terms of labour**	——	——	**Often used in better-class work, where stone is locally available**
Clay Bricks:	**Machine made**	**C.A.**	**U**	**The most versatile and enduring of all inorganic building materials**		**Better kiln design, rationalisation of fuel distribution**	**Decentralisation of industry. Reduction of production costs**	**Indian Standards Institute is developing a standard specification for bricks in India**
	Hand-made (burnt)	**C.A.**	**B**	Locally available. Low cost	Often of poor size shape and quality	Improved kiln and clamp design		**Used in all countries, but most in India and Pakistan**
	Sun-dried	**A**	**R**	Inexpensive. Useful in extremely dry areas	Subject to water and wind erosion	Soil stabilisation		In general village use in hot-arid countries
Stabilised soil:	**Pise (monolithic or blocks) Adobe (monolithic or blocks)**	**C.A.**	**R**	**More lasting than sun-dried bricks. Inexpensive. Suited to aided-self-help jobs.**	**Better for walls than for foundations**	——	——	**Good in foundations only for very dry areas, or with high proportion of stabilizer**
Timber:	**Framing posts (squared, with or without sole-plates)**	**C.H.**	**B**	**Availability, versatility.**	**Expensive. Must be teak etc., or impregnated**	**Chemical treatment of low-grade species**		**Concrete posts or stumps usually preferable, where costs are comparable**
	Framing posts (round bush poles or jungle or swamp wood)	**H**	**R**	**Local availability, inexpensive**	**Not durable unless treated. Aesthetically poor**	**Treatment with chemicals. (Creosote below ground)**	**Chemical Impregnation**	**In wide use in rural areas, often in conjunction with bamboo**
	Stumps (squared or round)	**H**	**R**	**Readily termite-proofed. Can be renewed if necessary**	——	**Fit gal. iron caps for termite-proofing**	——	**Wider knowledge and application of use of termite-caps is desirable in every country**
Piling:	**Timber or concrete**	**H**	**B**	**Used in made-up ground or swampy or silted areas**	**Very expensive. Must be impervious**	——	——	
Raft-Type	**Footings: usually of reinforced concrete**	**H**	**U**	**Structural stability on swampy ground**	**Extremely costly**	——	——	**Used only in cases of extreme foundation difficulties**

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TABLE 2

SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

FLOORS

	Materials	Climatic distribution[a]	Urban or rural utilization[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Brick:		A	B	Long lasting — impervious — and clean if rendered: cool	Requires firm subgrade—must be carefully laid to falls	—	—	For unsuspended floors only - not recommended without topping
Concrete:	Reinforced or otherwise	C	U	As suspended floor in multi-storey building — versatile	Very expensive—Relatively heavy	—	—	—
	Blocks or slabs	C.A.	U	Can be pre-cast for solid floors. Cool and clean if rendered	More expensive than brick or screeded ballast	Wider use of small block-making machines	Major industrial production	—
Stone:	Rubble	C.A.	B	Locally available—easily worked	Pervious — must be rendered — for solid floors only	—	—	Commonly used in many areas where suspended floors are not required
	Blocks or paving slabs	A	U	Cool and clean—attractive appearance	Heavy to transport and expensive to work	—	—	Used in parts of India as traditional flooring material
Earth:	Rammed	C.A.	R	Very inexpensive—suitable in very cheap construction if suitably covered	Difficult to keep clean—liable to rising damp, unhygienic	Soil stabilization and/or topping with rendering		The commonest of all floors in Indian and Pakistan villages in dry areas
	Rammed and stabilised	C.A.	R	Cheap — more or less impervious—cool underfoot	Surface wears rapidly —needs maintenance	Wider adoption after research	Wider adoption	A marked improvement on unstabilised rammed-earth floors
Timber:	Planks on joists	C	B	Strong, available—clean and versatile	Subject to insect and fungus attack unless 1st grade or treated	Chemical treatment of timbers other than 1st grade		The most generally used suspended floor in urban domestic construction in humid areas
	Palm trunks (e.g. "gaba gaba" etc.)	H	R	Inexpensive—locally available	Not very strong: Short-lived	—	—	Not suitable for impregnation
Bamboo:	Whole	C.H.	R	Cheapness — coolness—local availability—light and easily transported—gives good air circulation in suspended floor	Subject to insect attack and can harbour rats when used whole. Shorter life than timber	Chemical impregnation. Better structural details		Means to improve the uses of bamboo rather than to supersede it, are recommended. This is the most abundant organic material available cheaply in humid areas
	Split and flattened (on joists) Woven matting (on joists)	C.H.	R					
Tiles:	Concrete (including Terrazzo, etc.)	C.A.	U	Cool, impervious, easy to clean. Good appearance	Expensive—require firm base	—	—	Usually seen in better class work only
	Clay (glazed or unglazed)	C.A.	U	Less expensive than cement tiles	Require firm base and good mortar	—	—	—

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TABLE 2

SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

FLOOR FINISHES
WALLS

	Materials	Climatic distribution[a]	Urban or rural utilization[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Rendering:	Cement-sand	C.A.	U	Enduring—can be painted—resists mechanical damage — clean — cool underfoot	Expensive	——	——	Composition rendering preferable except in good class of work, requiring very hard finishes
	Lime—Sand—Lime—Surkhi etc.	C.A.	B	Cheaper than cement—more easily worked	Lower strength than cement—sand	Increase lime production		More often used than cement, in rural works
	Stabilised soil	A	R	Inexpensive—better than unstabilised	Wears quickly in floor — difficult to clean	Rendering		
	Clay and cow dung	A	R	Very inexpensive	Pervious to liquids; unhygienic	——	——	Very widely used in rural work in arid areas
	Bituminous preparations (emulsions etc.)	A	R	Easily applied — seals earth or gravel sub-grade	Expensive and seldom available—difficult to clean and maintain	——	——	Not in wide general use
Sheets:	Commercially produced (Linoleum, rubber-based etc.)	C	U	Cool underfoot, clean	Sometimes expensive and difficult to obtain	Greater local production and cost reduction		Wider use would improve hygienic properties of many suspended floors
Matting:	Various types, fixed (plaited bamboo "Sawali" etc.) Various types, movable	C.H.	R	Cheap or very cheap — cool—gives good air circulation—plentiful	Unhygienic unless frequently cleaned and renewed—Subject to attack by borer and termites	Chemical treatment		Very widely used in humid areas on suspended floors, over wood or bamboo joists
WALLS								**WALLS**
Concrete:	Orthodox monolithic	C	U	Enduring — strong — necessary in multi-storey buildings	Very expensive. Requires formwork and highly-skilled labour and design	Reduction in retail prices of cement	——	Seldom applicable to low-cost projects, except multi-storey
	Orthodox blocks (various)	C.A.	U	Enduring—strong—may be made on job site	More expensive than bricks - aesthetically inferior unless rendered	Introduction of small hand-operated block-making machines	Industrial mass production	Now used mainly in Malaya, India, Pakistan, Japan and Philippines
	Pre-cast slabs and posts	C	U	Enduring—strong—high finish and structural standard possible	Expensive — factory made—limit versatility of design	Study of present methods used in Malaya and their applicability to other countries		Factory production initially unsuccessful in India. Good results in Malaya to date
	Lightweight monolithic (Foam concrete or lightweight aggregates)	—	U	Ease of handling—high insulation qualities. Earthquake resistant	Expensive except where local light aggregates available nearby	Research into manufacture of expanded aggregates and study of Japanese methods	Factory production, using vermiculite or local light aggregates. Study of use of mineral slags and expanded clays	Now popular in Japan. Aggregates mainly pumice
	Lightweight blocks (Foam concrete or lightweight aggregates)	—	U	Can be made in light machines on job site—strong—earthquake resistant	Expensive except where local light aggregates available nearby			Has a future in countries with good cement supply

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TABLE 2

SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

WALLS

	Materials	Climatic distribution[a]	Urban or rural utilization[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Concrete *(Cont'd)*:	Fibre-concrete (bagasse)	H	B	Relatively inexpensive makes good, light blocks. High heat insulation qualities	Confined mainly to areas near sugar factories. Tendency to shrinkage and moisture movement in situ	Utilise waste fibres for building materials instead of for boiler fuel		Successful tests carried out in Indonesia and Philippines. Research on use of rice-husks is recommended
	Volcanic-ash concrete	H	B	Inexpensive — available in volcanic areas	Trass qualities variable — strength rather low	Improved standards for local manufacture		Mainly in Indonesia to date (trass-lime blocks)
Stone:	Boulders or random rubble	A	R	Inexpensive — locally available	Cannot be bonded — require excessive mortar	—	—	Confined mainly to hill areas
	Coursed rubble or ashlar	C	U	Enduring — attractive appearance	Fairly expensive — requires skilled labour	—	—	Seldom applicable to low-cost work
	As concrete aggregate	C	U		—	—	—	Normal in form of crushed stone or river gravel throughout the region
	Coral	H	R	Available in many coastal areas. Light weight. A first-class source of lime and for cement manufacture	Low crushing strength and a tendency to pulverise too readily; large proportion of voids	—	—	Used for footings and road foundations in Borneo and in coastal areas elsewhere
Sheets:	Asbestos-cement (usually corrugated)	C	B	Strong — impervious — readily transported — fairly enduring	Breakages common — liable to fungus growth in humid areas. The surface should be washed with dilute ammonia or 1 per cent aqueous solution of zinc silicofluorite to remove fungus. After this, surface should be painted	Increased local manufacture in conjunction with cement factories		Widely used everywhere. Lasts better in situ than most other sheets, but fractures readily
	Corrugated galvanized iron	C	B	Impervious — lightweight — readily transported. Fairly enduring	Only good qualities will withstand oxidisation - unsightly. Very hot	Attention to quality		Great quantities exported to region from Japan.
	Corrugated aluminium	C	B	Very light	Expensive — must be fixed with aluminium nails. Contact with iron causes deterioration quickly	—	—	Being fairly widely used in Burma.

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TABLE 2

SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

WALLS

	Materials	Climatic distribution[a]	Urban or rural utilisation[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Sheets *(Cont'd)*:	Fibrous plaster (Gypsum)	—	H	Good for internal linings in timber buildings. Could be cheap	Requires high-quality fibres, e.g. jute, sisal, etc.	Study Australian production techniques	Manufacture and distribute locally	Recommended for timber houses (internal linings)
	Wallboards, hard or insulating	H	B	Can be cheap, if utilising surplus timber products	Require machine production and some capital outlay	Increase investment in small production plants	Much wider use as linings and furniture	Desirable project for West Pakistan using reeds and grasses
	Plywood, waterproof or otherwise	H	B	Light and strong — versatile in building construction	Prices at present too high for general adoption	Increase investment in small production plants	Greater use as formwork and wall linings, etc.	Major producing country: Japan
	Fibre or Chip boards	H	B	As for wall boards—coconut fibres can be pressed without additional binders	As for wall-boards	Increase investment in small plants to process wood-chips and coconut fibres in particular	Wider use as wall linings and ceilings, etc.	FAO has done valuable research in Burma. Philippines and Indonesia are processing coconut fibres successfully
Timber:	Framing members	C.H.	B	Availability—versatility	Short life other than first-grade or when preserved	Better grading — chemical impregnation	Greater emphasis on machine — sawing techniques	Best of all organic construction materials
	Weather-boards	H	B	Availability—versatility				
	As base for mud plaster As base for "wattle and daub" (sticks and branches)				Used only in the crudest forms of construction. Subject to termite infestation	—	—	—
	Pandanus and Sago-Palm trunks ("gaba gaba" Indonesia) Blackpalm Gore palm and others	H	R	Inexpensive — readily transported by floating —cool walls	Impermanent—(better if plastered). Primitive means of construction. Habitat confined to coastal rivers and swamps	—	—	Cannot be readily treated with chemicals
Bamboo:	Whole or split; as panelling	C.H.	R	Availability—versatility—inexpensive. An excellent material at present greatly under-rated	Whole sections harbour vermin—shorter life than timber	Chemical impregnation and improved construction		Emphasis should be on improvement rather than on substitution. Note anti-plague designs in Indonesia
	Woven matting on frames	C.H.	R	Gives good cross ventilation. Inexpensive	Impermanence—subject to fungus borer and termite infestation			Emphasis should be on improvement rather than on substitution
	As base for mud plaster	C.A.	R	Cheapness—availability	Impermanence—termites			—

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TABLE 2
SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

WALLS

	Materials	Climatic distribution[a]	Urban or rural utilisation[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Bamboo *(Cont'd)*:	Framing members	C.H.	R	Cheapness—availability	Relatively short useful life—(2-5 years without some sort of treatment)			Improvement called for rather than substitution
Thatches:	Grass or reed	C.A.	R	Cool walls—inexpensive—locally available	Fire risk — termite and vermin infestation—impermanence			Used more commonly for roofs than for walls
	Sago, nipa, pandanus, coconut fronds etc.	H	R	Cool — inexpensive — locally available	Fire risk, etc. as for grasses, reeds			Found only in coastal areas
	Sago-frond midribs: "Injuk" (Java and Sumatra)	H	R	"Injuk" — Lasts longer than most other thatches				
	Tree bark	C.A.	R	Inexpensive—locally available	Fire risk, etc., as for grasses, reeds	——	——	A very poor material
	Rammed earth (pise) Puddled earth (adobe) Unstabilized or stabilized	A	R	Cool, inexpensive, available everywhere		Wider application as an economy measure, in all dry areas. This technique could overcome most production problems quickly, if widely adopted		Specially recommended for adoption as a medium for aided-self-help projects
Rendering	Cement-sand, cement-lime-sand, etc.	C	U	Resistant to moisture-hard surface-smooth and attractive finishes	Cement expensive and subject to transport and storage problems	Increased production and use of lime		Cement commonly used on better class work
	Mud plaster—stabilized	A	R	Better than unstabilized—quite inexpensive	——	Introduce in rural work in conjunction with stabilised soil construction—pise and adobe		Successful results in India to date, using a slow-breeding bituminous emulsion.
	Mud plaster—unstabilised	A	R	Very inexpensive—unlimited quantities—locally available	Unstable — erodes easily — soft — unhygienic	Soil stabilisation		——
Chemical preservatives:	Various	C.H.	B	Prolong life of organic materials up to 500 per cent	Cost up to 30 per cent of cost of material to be treated	Increased research and wide application of known techniques to timber, bamboo and thatches		Can be used also for fire-proofing
Paints:	Oil paints	C	B	External timber preservative-improves appearance	Relatively very expensive	——	——	Must be used on external walls in timber other than teak
	Colour washes	C.A.	B.R.	Internal and external treatment to walls of inorganic material. Mainly decorative	Needs annual renewal — no protective qualities	Cement-based paints preferable if available cheaply		Normal finish to adobe, pise and mud walls
	White wash	C.A.	R					
	Bituminous, cement proof, synthetic base and other paints	C	B	Give good finish to various surfaces	Mostly expensive	——	——	

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TABLE 2
SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

WALL FINISHES (cont'd)
ROOFS

	Materials	Climatic distribution[a]	Urban or rural utilization[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Paper:	Machine or hand-made	C	B	Inexpensive means of sealing matting ceilings and walls, etc. against dust and draughts	High fire — risk — impermanent	—	—	Traditionally used throughout Japan for wall linings, partitions and sliding panels
Mortars (for jointing):	Cement-sand	C	U	Very strong—impervious to water—necessary in burnt-brick jobs (foundations)	Very expensive—too strong for many materials, e.g. earth walls, pise, adobe blocks	—	—	Used normally for brick or cement block walls only
	Pozzolan cement (trass)	—	B	Cheaper than cement—available in volcanic areas	Strength varies	Research and wider use in volcanic areas		Commonly used in parts of Indonesia
	Lime-sand-volcanic ash	H	B.R.	Cheaper than cement—available in volcanic areas. Better than Pozzolan cement alone	Low strength in compression	Research and wider use of lime, in lieu of Portland cement, to reduce expense		See Indonesia: "mortars"
	Lime-sand, lime-surkhi	C.A.	B	Good mortar for low-strength walls	Lime quality frequently variable			Surkhi is commonly used in India, Indonesia and Pakistan.
	Mud unstabilised	H	R	Inexpensive — good for earth walls	As for unstabilised walls	Soil stabilisation		The most usual mortar in the arid areas
	Mud stabilised	H	R	Inexpensive. Better than mud alone	Insufficient strength for burnt brick and concrete block walls	—	—	Best used in conjunction with stabilised soil blocks
ROOFS								**ROOFS**
Tiles:	Clay: country tiles; shingle or pan type (pitched roofs)	C	R	Locally available—cheaper than machine-made. Good drinking water catchment	Limited by transport problem to areas adjacent to kilns	—	—	Widely distributed roofing material throughout the region (Java: 80 per cent)
	Arched clay pot type, interlocking ("guna")	C	R	Inexpensive—require no centering — easily made by village potters	Limited roof span possible. Suitable only for dry areas	Wider dissemination of knowledge of construction technique		A new development in parts of India where arched roofs are acceptable
	Machine made; Mangalore, Marseilles, pan, shingle and other patterns	C	B	Strong and impervious—good water catchment, long lasting	Mostly expensive, except near factories. Liable to breakage in transport	—	—	—
	Concrete; various patterns	C	B	Strong and impervious—good water catchment	More expensive than clay tiles. Very liable to breakage	Greater use in conjunction with expansion of cement production		—
	Asbestos-cement shingles	C	U	Good appearance—good water catchment. Easy to maintain,[c] strong — impervious	Relatively expensive, except where locally produced	Greater production in conjunction with cement factories		Widely used in Korea. Mostly imported into regional countries

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c. See remarks for asbestos-cement wall sheets re fungus treatment.

TABLE 2

SUMMARY OF BUILDING MATERIALS IN COMMON USE *(Cont'd)*

ROOFS

	Materials	Climatic distribution[a]	Urban or rural utilisation[b]	Advantages	Disadvantages	Possible Improvement		Remarks
						In short term	In long term	
Concrete:	Reinforced, monolithic	C.A.	U	Strong—impervious	Very expensive—for flat or arched roofs only	——	——	Used only in city work or high-class housing
	Precast slabs on joists	C.A.	U	Can be less expensive and lighter than monolithic		——	——	Not widely utilised as yet
	Reinforced inverted hollow blocks, etc.	C.A.	U	Can be less expensive and lighter than monolithic		——	——	——
Earth:	Mud, over battens and joists, unstabilised	A	R	Very inexpensive — easily available — cool	For flat roofs only — poor water catchment — high maintenance	Soil stabilisation and impervious rendering		The most common roof in the arid areas
	Mud, over battens and joists, stabilised	A	R	Inexpensive	——	——	——	——
Stone:	Slabbing	A	R	Local availability—good water catchment	Very heavy — transport costs very high	——	——	Commonly used in hill areas
	Slates	A	B.R.			——	——	
Processed sheets:	Corrugated galvanized iron	C	B.R.	Good catchment—light weight—impervious	Expensive — mostly imported—unsightly-deteriorates rapidly in salty atmospheres—hot	Increased local manufacture—Adoption of ceiling under, and air-ventilation of ceiling space, to reduce heat-transmission		Widely imported as substitute for local thatches, etc.
	Corrugated asbestos cement	C	B	Good catchment—light—impervious	Liable to breakage—fungus—hot. Rather expensive			Lasts longer in situ than CGI
	Corrugated aluminium	C	B	Very light—good catchment	Expensive — almost entirely imported—not as strong as CGI or CAC	——	——	—
Timber:	Wood shingles	H	B.U.	Local availability — fair water catchment — good appearance	Fire risk—fairly expensive	Chemical impregnation—planting of suitable trees in loco.—(particularly belian).		Commonly used in Indonesia and North Borneo, Sarawak and Brunei
	Ship-lapped planks (laid horizontally as weather boards)	H	B.U.		Require first quality timber or impregnation and 45° min. roof pitch	Chemical impregnation		Not very common. Only used where timber is abundant and cheap
Bamboo	Long lengths; interlocking halves	H	R	Inexpensive versatile locally available	Fire-risk—not lasting—subject to infestation			Forbidden in endemic plague areas of Indonesia, as subject to rat-infestation
	Halves; as shingles	H	R					
Thatches:	Tree bark	B.H.	R	Locally available—inexpensive—cool		——	——	Poor material — usually used on temporary or very humble structures
Thatches etc.	Grass, reed, leaves	B.A.	R	Inexpensive—cool—locally available	Fire risk—not lasting—subject to infestation — very high maintenance	Chemical impregnation		Widely used in rural areas throughout the region
	Sago, nipa, pandanus, coconut etc.	H	R					Used mainly in coastal areas—widely distributed use

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Alweyl, A. A comparative study of housing costs for different building types and densities. Haifa, Build-Research Station, 1956. 12 + 43 pp., plans, tables, charts. (Research paper no. 3.)

1. Sponsored by the United States Operations Mission to Israel, the report deals with the economic aspect of the various factors in the planning of housing schemes. The study is an attempt to determine the relation between residential densities and types of dwellings in public housing on one hand, and costs (including construction, development and land costs) on the other. Urban project studies consisted of single-story to 4-story buildings of types used in public housing schemes of the Ministry of Labour with a net density range of 3-14 dwellings per dunam (.22 acre).

2. Dwellings of minimum standard (immigrants schemes) have a floor area ranging from 32 - 48 sq. m. The dwelling comprises 1 1/2 - 2 rooms, kitchen and bathroom - w.c. Buildings are semi-detached or terrace and two-story building designed with provision for addition of one room. Foundations are adapted to the properties of the soil, walls are of hollow concrete blocks, roofs are tiled or concrete, ceilings are plaster on expanded metal network. Outside plaster is applied in 2 coats with cement rendering on the weather side, for the interior, ordinary plaster is applied in 2 coats. Windows are without shutters and only entrance and bathroom doors are put in, but no interior doors. Electrical installation consists of piping and meter connection (without wiring), sanitary installation, kitchen-sink and shower without tiles. Construction costs of a terrace-house unit exceed by 7% those of a unit in a semi-detached house of the same floor area. The cost of dwelling units of 37 sq. m. is equal for semi-detached houses and terrace houses of minimum standard. For floor areas over 37 sq. m. the terrace house tends to cost less than the semi-detached house. For dwelling units in 2-story buildings, construction costs are, on the average, 15% higher than for terrace houses. The main reason for this difference is the addition of the staircase. Basement costs are higher due to greater height. Light soil and favorable topographical conditions were presupposed for the above comparisons.

3. Dwellings of ordinary standard (Shikun Amami housing schemes) have a floor area of about 60 sq. m. They generally have 2 1/2 rooms with kitchen, bathroom and separate w.c., one balcony for the rooms and one for the kitchen. The building types are semi-detached or terrace houses, 2, 3, and sometimes 4-story buildings. Flooring is a terrazzo tile with white cement and skirtings, shutters for the windows, interior doors, glazed wall tiles comprising 5 sq. m., storage space, ventilated closets in kitchen and bathroom, hot-water system. When there is light soil and favorable topographical conditions the terrace house is the most advantageous and costs for semi-detached and 2-story buildings are 6% and 8.5% higher respectively. A slight decrease is observed when the number of stories is increased from 2 - 4 (4% lower in the latter case). When there is heavy soil and unfavorable topographical conditions, construction costs are much higher for single-story houses than for buildings of several stories. In this case, the unit in a 4-story building is cheapest and the costs for units in 3-story, 2 story, terrace and semi-detached buildings are 2, 5, 6 and 11% higher respectively. The difference in costs between a unit in a 2-story building and in a terrace house is negligible and the costs may be considered equal for both types.

4. The number of dwelling units per unit site area is a function of the building type. Effective planning, based on a suitable spacing of frontages, prescribes a maximum net density for each type of building.

5. For the density range 3-5 (number of dwelling units per dunam site) and under favorable soil conditions, the most economical alternative is semi-detached and terrace houses. Under unfavorable soil conditions (heavy soil and steep slopes), the alternative of semi-detached houses and 2-story buildings is somewhat more advantageous.

6. For the range 5-11 under favorable soil conditions the lowest costs were found for alternative comprising the highest possible percentage of terrace houses and 3-story buildings, and under unfavorable soil conditions for alternatives comprising the highest possible percentage of 2-story buildings.

7. For the range 11-14, the most economical alternative is that of 3 and 4-story buildings.

8. Development costs calculated for different densities included earthwork, roads and sidewalks, water supply, sewerage, electrical installation, additional development such as garden, fencing and yard fixtures. Conclusions drawn from study of development costs per dwelling unit as a function of net density show that in the density range 2.8 - 5.5 development costs decrease fairly rapidly with increasing density, the rate of decrease dependent on the stage of development and soil conditions. With full development and unfavorable soil conditions, development costs decrease in this range by 50% with partial development -- for heavy soil 45% and for light soil by 41%, with minimum development and favorable soil conditions by 40%.

9. In the density range 5.5-7.8, the rate of decrease is smaller, 14-20%, dependent on the stage of development and soil conditions.

10. In the density range 10.7 - 14, the decrease amounts to 6-10%.

11. Comparison of land costs for different densities. For the purpose of this study, three categories of land costs were assumed: IL. 1.--, 2.--, and 5.-- (one Israeli IL equals approximately $2.80. Calculations show that land costs decrease very rapidly with increasing density in the range 2.8 - 8.0. while above 8.0 the decrease is considerably slower.

12. Comparison of the total costs for different densities comprising the following items: construction development costs, miscellaneous additional costs, and land costs indicate the following conclusions for conditions of average construction:

Minimum standard projects comprise 50% 32.5 sq. m. dwellings, 25% 37-38 sq. m. dwellings and 25% 42 sq. m. dwellings, with the smaller units mostly single-story.

Ordinary standard projects comprise 60 sq. m. dwellings units.

For minimum standard, with land costs not taken into account, the total cost decreases with increasing density up to 5. An increase of the density up to 7 entails no economic advantages, and in certain cases may even result in increased costs.

With a density range 3-5, with favorable soil conditions, the most economical alternatives are those of semi-detached and terrace houses. With unfavorable soil conditions, combinations of semi-detached houses and two-story buildings are preferable.

With a density range 5-11, with favorable soil conditions, the most economical alternatives are those of a maximum proportion of terrace houses and two- or three-story buildings. With unfavorable soil doncitions -- combinations with the highest proportion of two-story buildings.

Voorhees Walker Foley & Smith. Climate control
for housing in the tropics and sub-tropics.
N.Y. [1945?]. unp., illus., maps, plans, tables.

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1. The treatise covers in topical form the major factors involved in building in the tropical and subtropical regions. Appended is a reprint of Tropical Architecture, from Pencil points, December 1941.

2. "After brief definitions of climate and weather, the various tropical and sub-tropical regions of the world are defined, together with pertinent climatic information, together with descriptions of their major climatic regions. There is a list of the major divisions of vegetation in relation to climate, a discussion of man's reaction to climate conditions, a page on climate and architecture, and notes on hurricane and earthquake areas. Tables of solar angles are given, and a brief note on solar radiant energy and housing insolation. One section is devoted to vegetation, with descriptive information, found in the tropics, subdivided by type."

3. The Tropical Architecture paper reprinted from Pencil Points consists largely of photographs and plans of the United States military base on Trinidad constructed by Caribbean Architect-Engineer, made up of the architectural firm of Voorhees, Walker, Foley & Smith, and the engineering firm of Parsons, Klapp, Brinckerhoff & Douglas. Shelter and all developments had to take into full consideration the tropical climatic conditions with its nerve-wearing effects of continuous heat, an extended rainy season, the primitive jungle background and the necessity at times of mingling with alien races of black and brown stock. In making their plans, the architects-engineers paid particular attention to the methods already devised in the region to make life comfortable and safe from the elements and from disease.